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9 Does Public Health Insurance Reduce Labor Market Flexibility or Encourage the Underground Economy? Evidence from Spain and the United States

Sara de la Rica and Thomas Lemieux

The basic postulate that there is a trade-off between social protection and economic flexibility crucially relies on the premise that legislation aimed at enhancing social protection imposes real constraints on the behavior of economic agents. This legislation must be enforced, however, for these constraints to be binding. In the realistic case where enforcement is imperfect, the presence of underground markets (or parts of the economy that avoid legislated requirements) may significantly alter the trade-off between social protection and economic flexibility. Underground markets are known to be important in countries such as Spain, where they account for more than 10 percent of the work force.[1]

Ideally, to look at the flexibility and adjustment question, one would like to have data on a country's underground and regular sector at different points in time. One would then see whether some firms adjust over time by simply not complying with the new legislation. The impact of legislations on economic flexibility would depend on the proportion of firms not complying with the legislations. We are fortunate to have one good survey of underground sector activities in Spain, but repeated surveys of underground sector activities are virtually never available. So although we cannot observe adjustments over time as new legislation is introduced, we can still use cross-national variation in

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1. These estimates are based on the ECVT data that we use in this paper. See also Muro and Toharia (1986).

social legislation to identify the impact of such legislation on the fraction of firms that decide to operate in the underground sector.

More specifically, to investigate the effects of the parameters of the public health insurance system in Spain on the decision of firms to operate in the underground sector, we compare Spanish firms to similar firms in the United States. We also investigate the comparative effect of the Spanish system on social protection, in this case on the percentage of workers covered by health insurance. These comparisons crucially rely on institutional differences in the financing and provision of health insurance in Spain and in the United States that need to be examined in detail. The U.S. system is often viewed as very flexible and economically efficient because the provision of health insurance to workers is based on private decisions of workers and firms.[2] By contrast, the same health care package is imposed on all workers and firms in Spain irrespective of their needs and/or capacity to pay for these services. The Spanish system is financed by a payroll (social security) tax and covers both workers and nonworkers.[3] Workers and their dependents are covered either under the social security card of the head of the family or, in the case of families with more than one worker, under their own card. Cardholders and their employers must in turn pay a social security tax of 25 percent of wages.

In a simple demand and supply framework, the payroll tax used to finance health care in Spain should have adverse employment effects on all the firms that decide to comply with the tax.[4] A closer analysis suggests, however, that summarizing the Spanish system in terms of a simple payroll tax may overstate the differences between the two systems. The point is that the incidence of a payroll tax that entitles taxpayers to some benefits is very different from the incidence of a tax that does not directly entitle the taxpayer to these benefits. For example, many Spanish workers who must pay the social security tax to get health insurance coverage would also prefer to pay an insurance premium under a privately provided insurance scheme. To some extent, the tax they pay is thus a mere relabeling of the insurance premium they would have to pay in a privately provided insurance scheme.[5] For these workers, the estimated im-

2. By efficiency we mean efficient provision of health insurance conditional on the insurance packages sold in the private market. We make no claims that the U.S. health care industry is efficient as a whole. For example, private provision of health insurance might create a "job lock" problem and thus an inefficiently low level of turnover (See Holtz-Eakin, ch. 6 in this volume).

3. The public health care system in Spain provides comprehensive health care to the whole population. Essentially all health care is provided by the public sector. By contrast, publicly provided health care is primarily available for only the elderly and families below the poverty line in the United States. The uninsured population typically consists of families in which the head is working but not earning enough to afford private health insurance.

4. Examples of empirical studies of the incidence of payroll taxes on employment include Hamermesh (1979) and Gruber and Krueger (1990).

5. One important difference between the two systems is that, since the payroll tax is proportional to wages up to a very high cap, high-wage workers pay more for the same service than low-wage workers do. Under the U.S. system, the health insurance premium is unrelated to wages, holding other characteristics of workers constant.

pact of a Spanish-type health insurance program on labor market outcomes such as wages, employment, and the decision to join the underground sector may thus be small. By contrast, the effects of a Spanish-type health insurance program may be large among workers who would not receive health insurance in the absence of a universal health insurance program.

This suggests comparing the characteristics of workers who do not receive health insurance in the United States to the characteristics of workers who do not comply with social security in Spain. If these characteristics were found to be similar, this would suggest that some of the adverse effects of a Spanish-type system on economic performance would be reduced by the decisions of firms and workers to join the underground sector. We investigate this issue by comparing the pattern and extent of the private provision of health care in the United States to the pattern and extent of compliance with the social security tax in Spain.

The paper is divided as follows. In section 9.1, we compare the structure of the labor market in Spain and in the United States, with a special emphasis on the provision of employee benefits. We then propose, in section 9.2, a simple framework to analyze the decision of firms to provide benefits to their employees. This section also analyzes the decision of Spanish firms to comply with the social security tax. In section 9.3, we compare empirically the pattern of compliance with social security taxes in Spain to the pattern of provision of health insurance by employers in the United States. The comparison is done along both demographic lines (age/gender/marital status) and industry affiliations of workers. We conclude by discussing the implication of our findings on well-being under the two systems of health insurance.

9.1 Institutional Background

This section describes the set of institutional constraints in which firms operate in Spain and in the United States. In particular, we discuss the characteristics of employee benefits in the two countries, how they are provided, and how they are financed. We also discuss the role of government economic policies and regulations in the growth of the underground sector in Spain and briefly describe the Spanish government policies aimed at enforcing compliance with social security taxes.

9.1.1 Employee Benefits in the United States

In monetary terms, the two most important components of employee benefits in the United States are health insurance and pensions. Most workers who have a health insurance plan get it through their employer. The employer usually pays most of the cost of the plan. Medicare and Medicaid, two government-sponsored programs, cover most health care needs of the poor and the elderly, but they are available to only a small fraction of workers. Most of the health insurance coverage of workers is thus privately provided in the

United States. By contrast, the government is a major provider of retirement benefits, via Social Security. Similarly, compensation for injuries is administered by state governments. Additional sickness and accident insurance may also be provided by the employer. Sickness leaves are either paid directly by employers or indirectly via private insurance, while permanent-disability pensions are provided by both Social Security and private insurance funded by the employer. Other wage benefits, such as overtime premium and vacation pay, are often counted as benefits, but we consider them as part of wage and salaries for the purpose of this paper.[6]

Separate statistics are available for three major categories of employee benefits that are often provided by employers in the United States. These three categories are insurance (mostly health and life), sick leaves (excluding those paid by private insurance), and private pensions. The firms' shares of expenditures on these three categories of benefits are presented in table 9.1, where these expenditures are also presented as fractions of the gross domestic product. Table 9.1 clearly indicates that insurance (mostly health insurance) accounts for the bulk of privately provided employee benefits in the United States, followed by pensions.

As mentioned above, a substantial fraction of employee benefits are publicly provided in the United States. Table 9.2 nevertheless indicates that, on average, the contribution rate of U.S. employers to privately provided benefits is larger (12.1 percent of wages) than their contribution rate to publicly provided benefits (10.7 percent of wages). Overall, the cost of benefits to employers and employees represents 30 percent of wage payments. This number would be even larger if employees' contributions to privately provided benefits were taken into account.

9.1.2 Employee Benefits in Spain

In Spain, the state, through social security, provides three major types of benefits to workers: health care, sick leave, and pensions.[7] These benefits are financed by a social security tax shared between employers and employees. We describe the three types of benefits in detail and discuss their financing below.

Health Care

This provision consists of any public health assistance, as well as a fraction of the cost of medications. This fraction depends on the medical condition of the worker. The beneficiaries of this provision are the worker (either employed,

6. See Morke and Morton (1990) for more details on the composition of employee benefits in the United States.

7. Unemployment benefits were a component of social security provisions until 1979, when they were transferred to the National Institute of Employment (INEM). Other minor provisions, such as temporal and permanent disability provisions, widow's and orphan's pensions, or family help are also provided by social security, but we will not analyze them in detail as they constitute a very small fraction of social security expenditures.

Table 9.1 **Shares of Expenditures on Employee Benefits**

	% of Total Expenditures	% of GDP
U.S. firms (private worker benefits)		
Insurance[a]	57.8%	4.3%
Sick leaves	8.9	0.7
Pensions	33.3	2.5
Spanish social security		
Health care	26.6	3.3
Sick leave	5.5	0.7
Pensions	61.0	7.6

Sources: United States: Employment Cost Indexes and Levels, 1975–1990, and *Statistical Abstract of the United States* (1990). Spain: Ministerio de Trabajo y Seguridad Social (1986).

[a]Includes life insurance

Table 9.2 **Contribution Rates to Publicly and Privately Provided Employee Benefits in 1988**

	Spain (public)[a]		U.S. Public[b]		U.S. Private:[b]
	Employer	Employee	Employer	Employee	Employer
Social security[c]	24.0%	4.8%	9.4%	7.2%	12.1%
Unemployment insurance[d]	5.2	1.1	1.3	0	0
Total	29.2	5.9	10.7	7.2	12.1

Sources: United States: *Statistical Abstract of the United States* (1990) and the Annual Statistical Supplement to the *Social Security Bulletin* (1990). Spain: Ministerio de Trabajo y Seguridad Social (1993).

[a]Administrative social security (and unemployment insurance) tax rates that apply to earnings between a minimum base and a maximum base.

[b]Average contribution of employers to the indicated item, divided by wages and salaries including supplemental pay such as bonuses, paid vacations, and holidays.

[c]The following benefits are included under social security: pensions, health insurance, sickness leaves, and workers' compensation for workplace injuries.

[d]Unemployment insurance in Spain is financed by employer and employee in a proportion of 60 percent. The rest is provided by the state, through the public treasury. The contribution rates are for 1985.

retired, or unemployed), the spouse, and any close relatives who live with the worker and depend economically on him or her.[8] Health care provisions can also be extended to Spanish residents who do not work and who lack economic resources. To access these provisions, workers must be affiliated with social security and pay the taxes. The affiliation with social security is legally com-

8. Note that in dual-earner households, both spouses must pay the social security tax. Since the second earner is already covered under the social security card of the first earner, he or she does not get any additional health care benefits in return for paying the tax.

pulsory. It is the responsibility of the employer to affiliate the worker in the five days following the beginning of an employment contract. From that date onward, the employer deducts taxes from the wages of the employee and periodically pays both employee and employer taxes to the social security system.

Sick Leave

This benefit provides pay to workers when they temporarily cannot work because of sickness. For ordinary sickness, workers receive 60 percent of their regular wages from the fourth day to the twenty-first day of sickness.[9] They then receive 75 percent of their regular wages from the twenty-first day onward.[10] In cases of maternity leaves or leaves for workplace injuries, the replacement rate is 75 percent from the fourth day onward. This provision is available for twelve months and can be extended six more months. Workers can use this provision only if they have been affiliated with social security and paid their taxes for at least 180 days before the start of the sick leave.

Pensions

This provision offers pay to retired workers (the age of retirement in Spain is 65). The amount the worker receives varies with the number of years that the worker has contributed to social security. It ranges from 50 percent of the wage (or the maximum or minimum base, if the wage is not within these limits) for workers who have contributed ten years, to 100 percent for workers who have contributed for thirty-five years. This provision lasts until the death of the pensioner. Workers can access this provision when they have paid social security taxes for at least ten years and have contributed to social security for at least two of the eight most recent years.

Table 9.1 shows the share of each of these three major components in total social security expenditures. These three components are also shown as fractions of the gross domestic product. Pensions are the largest component of social security expenditures in Spain, followed by health care. Pensions in Spain also represent a larger fraction of the gross domestic product (7.6 percent) than do privately provided pensions in the United States (2.5 percent). The relative importance of pensions in Spain and in the United States is much more comparable when publicly provided pensions are taken into account in the United States.

9.1.3 Social Security Taxes in Spain

As mentioned before, workers can only gain access to social security provisions when they are affiliated with social security and when they and their em-

9. Although on many occasions the whole wage is the monetary base, minimum and maximum bases exist that vary by occupation. For workers who eam more (less) than the maximum (minimum) base, the maximum (minimum) base is considered instead of the whole wage.

10. From the first day to the fourth, the employer must pay the worker. This disposition was modified in April 1992, so now the employer must pay the worker from the first to the fifteenth day, and from then onward, the social security offers the provision.

ployers pay their taxes to the system. These taxes are unequally shared by employers and employees. Table 9.2 shows that the tax rate paid by employers is 24 percent, while the tax rate paid by employees is about 5 percent. The sum of social security and unemployment insurance taxes amounts to almost 30 percent of wages for the employer. This large payroll tax may explain why employers can feel tempted to avoid this indirect cost by hiring workers off the books—that is, by not affiliating them with social security and hence not paying the taxes. Workers who are not affiliated with social security or do not pay the taxes or both are said to be working in the informal, or underground, sector. As we will see below, hiring workers off the books has not been a rare practice in Spain during the past two decades. In the remainder of this section, we explain the reasons for this resurgence of the underground sector in Spain.

9.1.4 Underground Sector in Spain

In order to understand the patterns of the underground economy in Spain during the 1980s, it is important to know which factors contributed to its development. It seems fair to say that the division between the formal and the informal (or underground) economy dates back to the early 1970s. Under Franco's dictatorship, the state set wage increases and thus managed to keep real wages very low until the 1970s. Strikes were illegal, and any kind of organized labor was suppressed. However, the consolidation of workers' opposition to the regime in the early 1970s started to put an upward pressure on real wages. In an effort to keep wages down and to quiet workers' opposition, the state decided to increase the amount of workers' benefits in 1972. Unemployment benefits were expanded and employer taxes were increased.

After Franco's death in 1975, Spain started a quick political transition to democracy. In 1977, unions were legalized as representatives of workers in collective bargaining. Their first aim was to increase the level of real wages of workers. Over the period 1973–79, real wages increased at an average annual rate of 8.2 percent. The combination of increases in direct labor costs with rapid increases in indirect labor costs was considered by some people to be the main cause of the resurgence of the underground economy. But what seems to be the key in understanding the spread of the underground sector in Spain is the state of the Spanish economy when these measures were implemented. The average inflation for the 1973–79 period was 18.3 percent, while the growth rate of real gross domestic product per capita was only 1.4 percent (it was 5.8 percent in the 1968–73 period). The deep recession led to massive plant closures, which increased the rate of unemployment from 5.8 percent in the 1974–79 period to 17.4 percent in the 1980–85 period. Workers who had been displaced from the formal sector became an attractive labor force either for firms already operating in the underground sector or for those who, in spite of operating in the formal sector, wanted to employ some workers off the books. In doing so, firms reduced labor costs greatly by not paying social security taxes. Employing workers off the books also gave firms the freedom to fire these workers when they were no longer needed, which solved a serious problem for

employers, as firing workers who had permanent contracts necessitated costly severance payments. Although most displaced workers would have preferred to work in the formal sector to enjoy social security provisions, working in the underground sector was typically the only way for them to find a job.

In addition to the weak state of the Spanish economy and of the Spanish labor market, some institutional factors also encouraged the growth of the underground economy. First, the legal framework lacked (and still lacks) any criminal disposition for fraud against social security. The penalty in most cases was only administrative, consisting of a fine on employers who did not pay social security taxes.[11] Besides, the possibility of being caught was very small, especially for small firms. Furthermore, to explain how the Spanish authorities felt about the underground economy, we should mention a comment on the underground economy made by Joaquin Almunia, minister of labor, in November 1984. He stated that it was "necessary to try to accept the underground economy because it reflects the inadequacy of the laws." He characterized the underground economy as a "lesser evil" and explained that the government's approach would be to facilitate the legalization of clandestine enterprises "through the reduction of social security payments, and other measures" (*El Pais*, 3 November 1984).

Unions could not do much to force employers to pay social security taxes, given the weak state of the labor market in the 80s. As a result of other union efforts, the Spanish labor market had very little flexibility because of the very high cost of firing workers with indefinite contracts. Had unions tried to force employers to hire workers in the formal sector, even fewer workers would have been employed, and unions would have been blamed for increasing unemployment, which was already very high. In that sense, for unions as well as for the government, the underground economy was a lesser evil than an even higher rate of unemployment.

By the mid-1980s, there was a widespread belief that the underground sector was important enough to be considered as part of the Spanish system. Even the government believed that the official statistics overestimated the unemployment rate in Spain because people who worked in the underground sector were counted as unemployed. In order to measure a more accurate unemployment rate, the government carried out a survey, called the 1985 Survey of Living and Working Conditions (ECVT), which is the survey used in this paper. As we will discuss later, the survey did establish the existence of a large underground sector but was less successful in showing that the measured unemployment rate was too high.[12]

11. When a worker was caught working off the books, the employer had to reimburse to the state all the unpaid social security and unemployment insurance taxes plus a 20 percent penalty for the whole period the worker had been employed.

12. The explanation for this puzzle is that most underground workers report themselves as working in the regular labor force survey. A similar phenomenon was observed by Ramos (1988) in Puerto Rico.

9.2 The Economics of Employee Benefits and Tax Compliance

Given the institutional environments in which firms operate in Spain and in the United States, we turn to the question of how profit-maximizing firms react to the different constraints being imposed on them by these two environments. We first examine the determinants of employers' decision to provide benefits to their workers in a simple demand and supply framework, focusing on the case of health insurance. This is more or less representative of the U.S. system, in which health insurance is privately provided to workers. We then focus on the case in which, as in Spain, the employer is forced to provide these benefits through the social security system. On the one hand, forcing the provision of employee benefits through social security should not affect the behavior of employers who would have provided benefits to their employees in the absence of social security. For these employers, the Spanish system is merely a relabeling of the U.S. system. On the other hand, employers who would not otherwise provide benefits to their workers have to either adjust their employment and production choices or avoid paying social security taxes.

9.2.1 A Model for the Private Provision of Employee Benefits

Consider a model in which firms offer wage-benefit packages (W,B) to their workers. For simplicity, consider the case in which only a given benefit package (health insurance) is available to workers. B is an indicator variable equal to one when workers are getting this benefit package from their employers and equal to zero otherwise. This model is quite similar to the basic model of equalizing differences for job amenities considered by Rosen (1986). As in models of equalizing differences, we want to solve for the hedonic equilibrium in the market for labor and for benefits.

Assume that preferences of worker i are characterized by the following utility function that is separable in a composite consumption good C and in B:

$$U_i(C,B) = u(C) + \theta_i B \,. \tag{1}$$

For simplicity, assume that consumption of the composite good C is equal to labor earnings W. Also assume that workers have a reservation wage W^r and that they can only obtain health insurance from their employers.[13] The reservation wage W^r varies across workers, depending on their skill level. Consider the wage-benefit packages $(W,0)$ and $(W - \Delta W,1)$. The worker prefers the package that offers health insurance when the following inequality is satisfied:

$$\theta_i > u(W) - u(W - \Delta W) \,. \tag{2}$$

This inequality is satisfied whenever the utility a worker attaches to health insurance, θ_i, is larger than the value, in utility terms, of the income that has to

13. More generally, it may be that the cost of benefits such as health insurance is prohibitive for workers who want to buy them on their own, perhaps because of adverse selection.

be sacrificed to obtain health insurance (ΔW). The utility that workers attach to health insurance, θ_i, depends on a series of household and demographic characteristics. Clearly, workers already covered under the health insurance plan of another household member do not benefit from having their own health insurance plan. For these workers, θ_i is thus equal to zero. The effect on θ_i of health insurance coverage under the policy of another household member is particularly important for married women and teenagers. More generally, the utility of health insurance coverage also depends on the number and the health status of household members covered by the plan. Taken together, these considerations imply that health insurance is typically the most valuable for married men and the least valuable for youth and married women.[14]

In the standard case where the marginal utility $u'(W)$ declines in consumption, the loss of utility $u(W) - u(W - \Delta W)$ is inversely related to eamings W. This is due to a standard income effect that makes health insurance relatively more valuable (compared to money) when eamings increase.[15] Increases in either θ_i or W thus increase the probability that the inequality in equation (2) is satisfied and that workers will want to receive health insurance coverage from their employers.

We now tum to the supply side of the market, where firms must decide which wage-benefit package should be offered to each worker. Consider a profit-maximizing firm that has access to a production technology with decreasing marginal product of labor. The firm also has access to a pool of workers characterized by utility functions such as the one in equation (1) and by a fixed reservation wage W^r. The cost to the firm of offering health insurance coverage to worker i is equal to BC_i. For now, assume that BC_i is the same (BC) for all workers. It is straightforward to show that in the efficient hedonic equilibrium, all workers whose willingness to pay for the benefits exceed the cost, BC, of providing these benefits will receive the benefits. The willingness to pay for the benefit, WP_i, is the amount of money such that

$$\theta_i = u(W) - u(W - WP_i) .$$

Workers will thus receive benefits whenever the following inequality is satisfied:

$$\theta_i > \theta^* = u(W^r) - u(W^r - BC) . \tag{3}$$

In the most interesting case to consider, inequality (3) is only satisfied for a fraction of the work force. Workers who receive the benefits are paid a wage rate $W^r - BC$, while workers who do not receive benefits are paid W^r. The

14. Demographic and household variables can be thought of as proxies for whether a person would be covered by some health insurance plan if that person were not covered under a plan offered by his or her current employer (this is not observed in standard data sets such as the Current Population Survey).

15. This income effect may explain the positive relationship between wages and benefits across industries. It may also explain some of the cross-country differences in the share of health care expenditures in the gross national product.

relevant marginal workers for employment determination are those who do not receive benefits. Employment is thus determined by the condition

$$VMPL(L^*) = W^r, \tag{4}$$

where $VMPL(L)$ is the value of the marginal product of labor evaluated at L.

In this simple case where BC_i is the same for all workers, supply factors thus have only an indirect role on the provision of health insurance through the income effect. The idea is that high-skill workers, because their reservation wage is higher, command a better compensation package than low-skill workers. Everything else being equal, their compensation package is thus more likely to include health insurance because of income effects. Supply factors play a richer role in the provision of health insurance benefits when the assumption that BC_i is constant is relaxed. It is well known that, in the United States, supply factors such as the size of the firm have a big effect on the cost of providing health insurance. Since θ^* is positively related to BC in equation (3), the critical value θ^* must be larger for small firms than for large firms. As a result, relatively fewer workers will be covered by a health insurance plan in small firms than in large firms. Differences in the cost of supplying health insurance among industries may also explain differences in health insurance coverage among firms in the same industries. Furthermore, the cost of providing health insurance may depend on the fraction of workers in the firm that are covered. As a result, the distribution of all workers' preferences will affect the probability of coverage of a given worker through the preferences' effect on BC and θ^*. For example, it may be harder to obtain coverage in a firm employing mostly youths who are already covered under their parents' health insurance plan than in a similar firm employing mostly heads of households. The average characteristics of workers employed in a given firm or industry may thus be an important supply factor.

Other supply factors may also be important once the assumption of perfectly competitive markets is relaxed. For instance, it is well known (Freeman and Medoff 1984) that wages are higher and benefits packages more generous in unionized than in nonunionized environments. More generally, some labor market rents may be dissipated in the form of both wages and benefits. Health insurance coverage rates are thus likely to be higher in high-rent than in low-rent industries.

What is the effect of mandating benefits in this simple model? If employers comply, all workers will receive the benefits, but employment will be reduced. Clearly, all workers who were receiving benefits in the absence of mandatory provision will remain employed, since it is efficient to employ them and to provide them with benefits. The employment of workers who were not receiving benefits in the absence of mandatory provision will, however, decrease until the following condition is satisfied:

$$VMPL(L^{**}) = W^r - WP(L^{**}) + BC, \tag{5}$$

where $WP(L)$ is the willingness to pay of the L^{th} worker (ranked in decreasing order). $WP(L^{**})$ must be lower than BC since the marginal worker was not receiving benefits in the absence of mandatory provisions. Since the function $VMPL(L)$ is decreasing in L, the new employment level, L^{**}, must be lower than employment in the absence of mandatory provisions, L^{*}. Mandatory benefits thus reduce the employment of workers who would not otherwise receive benefits, but do not affect the employment of workers who would receive benefits in the absence of mandatory provisions.[16]

9.2.2 The Economics of Compliance with the Social Security Tax

The model of private provision of benefits of section 9.2.1 was a stylized representation of the U.S. system. This model, however, is clearly not an accurate representation of the Spanish system. The key difference between the two systems is that all Spanish firms have to contribute to the financing of the public health insurance system by paying social security taxes, while U.S. firms pay for health insurance on a voluntary basis. Since Spanish workers need a social security card to have access to public health care, the same system could be implemented by mandating employers to provide health insurance to their workers at a cost BC equal to the corresponding social security tax.[17] With perfect enforcement of social security provisions, we can use the terms "mandating benefits" and "paying the social security tax" interchangeably.

As discussed earlier, an important feature of the Spanish system is that many firms adjust to the constraints imposed by the social security system by simply not complying with the social security tax. In Spain, when employers do not comply with social security, employees do not hold social security cards, which prevents them, in principle, from gaining access to public health care services. As we said before, however, workers who do not hold a social security card may still be covered under the social security card of another household member. This situation is thus qualitatively similar to the situation of U.S. workers who do not get health insurance from their employers but are covered under the health insurance plan of another household member.

Formally, compliance can be treated as a problem of profit maximization under uncertainty.[18] The uncertainty arises because enforcement of government regulations is costly and thus imperfect unless very large resources are devoted to the detection of noncompliers.[19] Noncompliers thus face a probability λ, which is smaller than one, of being detected. In the event they are caught cheat-

16. See Summers (1989) and Danzon (1989) for related points on the labor market effects of mandating benefits.

17. We implicitly assume that the quality of care—that is, the value of the benefits in utility terms—is the same under the two systems.

18. There is a vast theoretical literature on the economics of tax compliance (see Cowell 1990, and the studies mentioned therein). By contrast, the empirical literature is still in its infancy, partly because of data limitations.

19. This is the basic postulate of the economic approach to criminal behavior (see Stigler and Becker 1977).

ing, they have to repay the social security tax plus a penalty P. A risk-neutral firm decides to comply (or not comply) by comparing profits when complying to the expected value of profits when not complying.

While the expected profits of employing an L^{th} worker and paying social security is given by

$$E\pi^{c} = VMPL(L) - (W^{r} - WP) - BC,$$

the expected profits of employing this worker but not paying social security is given by[20]

$$E\pi^{nc} = VMPL(L) - W^{r} - \lambda(BC + P).$$

Note that BC is now equal to the social security tax. The new hedonic equilibrium with a social security tax BC and the possibility of noncompliance is easily derived by comparing the expected profits $E\pi^{c}$ and $E\pi^{nc}$ to the expected profits when the firms does not employ the worker (zero). Comparing $E\pi^{c}$ and $E\pi^{nc}$ indicates that social security will be paid for all workers whose willingness to pay for health insurance, WP, exceeds $BC - \lambda(BC + P)$. Social security is thus paid for all workers whose θ_i satisfies the following inequality:

$$(3') \qquad \theta_i > \theta^{*} = u(W^{r}) - u[W^{r} - BC + \lambda(P + BC)].$$

The total employment of a firm not paying social security for some of its workers is the value of L such that $E\pi^{nc}$ is equal to zero. Total employment must thus satisfy the following condition:

$$(5') \qquad VMPL(L) = W^{r} + \lambda(P + BC).$$

Employment is thus lower than in the case of private provision with incomplete coverage (equation [4]) but higher than in the case of mandatory benefits when enforcement is perfect (equation [5]). Except for the term $\lambda(B + P)$, the inequality (3′) is the same as the inequality (3). Thus, the impact that supply and demand factors listed in section 9.2.1 should have on the decision to privately provide health insurance should be similar to their impact on the decision to comply with the social security tax. In addition, the decision to comply with the tax is affected by the probability of detection λ and the penalty P. Both λ and P reduce the expected profits of not complying and thus increase the chances the firm will comply with the social security tax.

It is also important to point out an important difference between the cost of providing benefits in a U.S.-type system and the amount of payroll taxes paid in a Spanish-type system. While the cost of providing private health insurance is more or less fixed for workers with similar health conditions, the social security tax is proportional to wages and salaries up to a very high exclusion cap.

20. The profits of a firm that does not comply and does not get caught are equal to $VMPL(L) - W^{r}$. However, these profits are reduced to $VMPL(L) - W^{r} - BC - P$ when the firm gets caught. The expression for $E\pi^{nc}$ is obtained by taking the expected value of these two profit levels (the probability of detection is equal to λ).

In Spain, the variable BC is thus proportional to wages. The income effect in the demand for coverage should thus be smaller in Spain than in the United States, since higher wages increase the marginal utility of benefits but also increase the costs (taxes) of obtaining coverage through social security.

9.2.3 Empirical Implications

The model proposed above is not aimed at generating precise, testable implications on the extent and pattern of provision of health insurance benefits in the United States and of compliance with the social security tax in Spain. Rather, it tries to establish that these patterns should be similar in the two countries. Supply-side considerations suggest that firms in industries that are the most likely to provide health benefits in the United States should also be the most likely to comply with the social security tax in Spain, assuming the characteristics of workers and industries are similar in Spain and in the United States. Demand-side considerations also suggest similarities in the incidence of health insurance coverage in the United States and compliance in Spain along age/gender/marital status lines.

Our empirical model is obtained by treating the inequalities (3) and (3′) as participation conditions in discrete-choice models for the private provision of health insurance and the decision to comply with social security. Consider the following stochastic specifications for the preference variable θ_i and the supply cost variable BC_i:

$$\theta_i = \beta_x' x_i + u_i , \tag{6}$$

$$BC_i = \beta_z' z_i + v_i , \tag{7}$$

where x_i is a vector of demand-side (or preference) variables, z_i is a vector of supply-side variables, and u_i and v_i are two normally distributed error terms. Furthermore, consider the first-order approximation of $u(W^r) - u(W^r - BC)$:

$$u(W^r) - u(W^r - BC) = \gamma_0 + \gamma_1 W^r + \gamma_2 BC , \tag{8}$$

where $\gamma_1 < 0$ and $\gamma_2 > 0$. Substituting equations (6), (7), and (8) into the participation condition (3) yields the following threshold equation:

$$\varepsilon_i = (u_i - \gamma_2 v_i) > \gamma_0 + \gamma_1 W^r + \gamma_2 \beta_z' z_i - \beta_x' x_i . \tag{9}$$

Benefits are thus provided whenever ε_i is larger than the right-hand side of equation (9); benefits are not provided otherwise. Under the assumption that u_i and v_i are normally distributed, it is straightforward to estimate this model using maximum-likelihood probit methods. The same probit model can be estimated for the decision to comply with social security taxes when $P\lambda$ is a given constant for all jobs. Differences in $P\lambda$ across industries would be captured by a set of industry effects included in the vector z_i.

On the one hand, this empirical model focuses on the behavior of an individual. The reservation wage of the individual is one of the important determi-

nants of the decision to provide health insurance or to comply with social security taxes. On the other hand, health insurance policies often cover all household members, which suggests looking at a model of household behavior instead of individual behavior. Estimating such a model is beyond the scope of this paper, however, because of data limitations.[21] It may nevertheless be preferable to capture income effects by looking at the effects of family income, as opposed to the income of the individual, on the probability of holding a health insurance plan. We will thus replace W^r by a measure of family income in the empirical specification of the probit model.[22]

A related point is that many family members may be covered under a health insurance plan in the name of another household member. It is thus important to distinguish whether an individual is covered by a plan from whether the individual holds a plan under his or her name. The empirical analysis seeks to explain the probability of the latter.

9.3 Results

In this section, we first describe the data sets used and present comparative statistics on the composition of the labor force and the structure of wages in Spain and in the United States. We then analyze the decision to comply with social security (Spain) and the decision to provide health insurance (United States), using maximum-likelihood probit techniques.

9.3.1 Data Sources

The Spanish data are taken from the Survey of Living and Working Conditions (henceforth ECVT). This survey was carried out in the last quarter of 1985. Its main purpose was to measure the magnitude of the underground economy. More than sixty thousand people were interviewed. People were asked questions about their socioeconomic characteristics and job experiences. Workers were also asked whether they had a social security card. People who answered yes to this question were also asked whether they paid social security taxes, as it is possible but unlikely to be affiliated but not pay the taxes. Answers to these two questions were used to identify those workers who were working off the books, either because they did not have a social security card or because in spite of having one they did not pay taxes. Furthermore, the workers who did not have a social security card were asked whether they were

21. Only one household member was interviewed in each household surveyed in the Spanish survey used in this paper. As a result, we cannot jointly model wages and compliance with social security taxes for all household members. The best we can do is to include measures of family income and family composition in the probit model.

22. If family income were exogenous, its effect should be positive because of income effects. Family income may, however, fail to be exogenous to the extent that unobserved preferences for benefits, u_i, are negatively correlated with labor income. A person with a large u_i prefers to trade off more benefits for less income. Estimates of the effect of family income may thus be biased downward.

covered by some relative's card. As will be shown later in the paper, a typical underground worker is a married woman covered by her husband's social security card.[23]

Estimates of the size of the underground sector based on self-reports of illegal activities may certainly understate the importance of the phenomenon. It is thus important to keep in mind that many of the estimates reported in this paper may be lower bounds to the true effects.[24] One weakness of the ECVT data set is that it does not contain direct measures of wage rates but offers only seven brackets for monthly earnings. The income measure we use for the empirical analysis consists of the midpoints of these brackets.[25]

For the United States, we use the May 1988 Current Population Survey (CPS), which includes an employee benefits supplement. The May CPS has been matched to the March demographic file, which includes additional information on benefits coverage in 1987. We select comparable samples of workers aged 16 to 70 from the ECVT and the May 1988 CPS. More details on the construction of the U.S. and Spanish samples are provided in the data appendix.

9.3.2 Wages and Employment in Spain and the United States

The sample means of several socioeconomic variables are reported for Spain and the United States in table 9.3. These means suggest important differences in the composition of the labor force in the two countries. Women account for close to half of the labor force in the United States but only 28 percent of the labor force in Spain. In addition, the U.S. work force is more educated. In Spain, 25 percent of workers have completed only primary school, as opposed to 13 percent in the United States. Furthermore. 23 percent of workers in the United States hold a college degree, compared to 13 percent in Spain. These differences partly reflect the fact that it takes more years to complete a similar degree in Spain than it takes in the United States.[26] This explains why the number of years of education completed are similar in Spain and in the United States. Another important difference between the labor markets in the two countries is that the duration of jobs is longer in Spain than in the United States. For example, 40 percent of U.S. workers have more than five years of

23. Alternatively, some dual jobholders may pay social security taxes on their primary job but not on their secondary job. Information on this particular type of underground sector work is not available, however, in the ECVT data.

24. Evidence based on a comparison of reported income and expenditures in the underground economy in Canada suggests that approximately 70 percent of underground sector income (excluding income from criminal activities) is self-reported in survey data. See Fortin, Lemieux, and Fréchette (1990) for more details on the survey data used for these calculations.

25. The midpoints for the upper (more than 200,000 pesetas) and lower (less than 25,000 pesetas) brackets are calculated by assuming that income follows a lognormal distribution. See the data appendix for more details and evidence that this imputation scheme has little effect on the parameter estimates.

26. For instance, it usually takes eighteen years to complete a university degree in Spain, compared to sixteen years in the United States.

Table 9.3 **Sample Means of the Variables**

	Spain		United States	
	Mean	Standard Deviation	Mean	Standard Deviation
Weekly earnings[a]	179.915	106.040	449.120	310.120
Sex (1 = female)	0.280	0.450	0.460	0.248
Married (1 = married)	0.680	0.470	0.620	0.235
Age	38.870	12.970	36.890	12.318
Education (years)	12.890	3.620	13.030	2.669
Primary	0.250	0.430	0.130	0.113
High school	0.410	0.490	0.400	0.240
Vocational	0.080	0.270	0.200	0.640
College	0.130	0.340	0.230	0.177
Tenure (< 1 year)	0.110	0.320	0.300	0.490
Tenure (1–5 years)	0.210	0.400	0.305	0.211
Tenure (> 5 years)	0.660	0.470	0.395	0.239

Sources: Based on 17,463 observations from the 1985 ECVT (Spain) and 23,402 observations from the 1988 May CPS (United States).

[a]The earnings variable in Spain is monthly earnings (after taxes) divided by four, while it is weekly earnings (before taxes) in the United States. Both earnings variables are expressed in 1990 U.S. dollars. The original earnings numbers were first converted in 1990 pesetas and 1990 U.S. dollars, using the gross domestic product (GDP) deflators for Spain and the United States. The 1990 pesetas were then converted in 1990 U.S. dollars, using OECD Purchasing Power Parity numbers for 1990 (113.08 pesetas/dollar).

tenure, compared to 66 percent in Spain. Finally, real weekly earnings are much higher in the United States (449.1 in 1990 U.S. dollars, before taxes) than in Spain (179.9 in 1990 U.S. dollars, after taxes).

The industrial composition of employment in Spain and in the United States is shown in Figure 9.1. The key difference between the two countries is that agriculture accounts for a much larger share of employment in Spain (14.3 percent) than in the United States (1.8 percent). The United States compensates by having a larger share of employment than Spain in trade and services.

We compare the structure of wages in Spain and in the United States by fitting standard log earnings equations, using ordinary least squares (OLS). The results are reported in table 9.4. All the specifications include a set of region dummies (four in the United States, sixteen in Spain); dummies for gender, marital status, and their interaction; potential experience and its square interacted with gender; and the highest grade completed. The specifications reported in columns 2 and 4 also include twenty-four industry dummies, seven occupation dummies, two dummies for tenure, and a dummy variable for part-time status. The specification for the United States also includes dummy variables for race and coverage by a collective bargaining agreement.

The estimated effects of gender and marital status on earnings are compara-

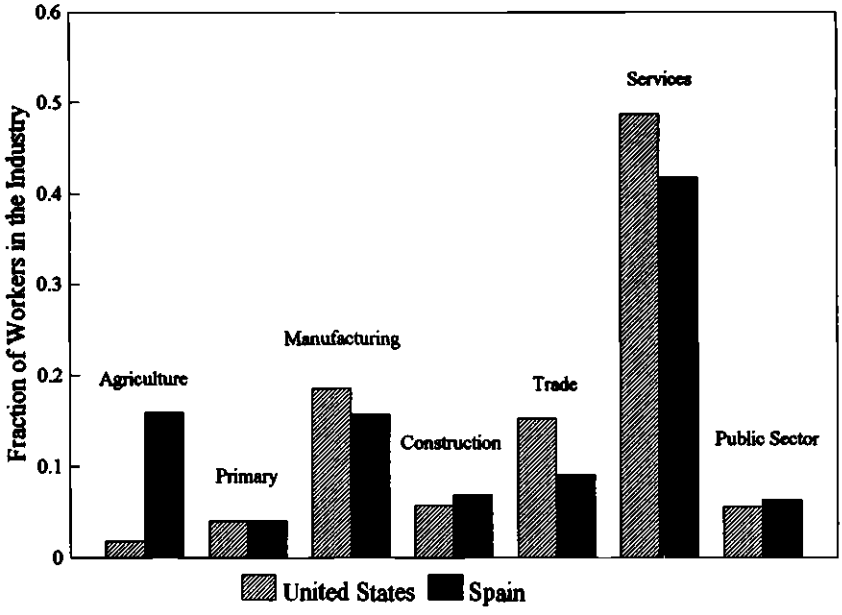

Fig. 9.1 Employment shares by major industries, Spain and the United States
Sources: Calculations of the authors, using the 1985 ECVT (Spain) and the May 1988 Current Population Survey (United States).

ble in the two countries, while the estimated returns to education and to experience are higher in the United States than in Spain. These estimated returns are reduced when job characteristics are included in columns 2 and 4, but their pattern does not change. The estimated returns to tenure reported at the bottom of table 9.4 are much larger in the United States than in Spain. For instance, workers with more than five years of tenure are estimated to make 25 percent more than workers with less than one year of tenure in the United States, but only 10 percent more in Spain. Finally, the estimated interindustry wage premiums are large and significant in both countries. The weighted standard deviation of the estimated industry wage premiums is .165 in the United States and .161 in Spain. The weighted correlation between the estimated premiums in the two countries is .688. This positive correlation can also be observed in figure 9.2, which presents a plot of the industry wage premiums in Spain as a function of the wage premiums in the United States. The fitted regression line depicted in figure 9.2 has a slope of .527.

9.3.3 Determinants of Compliance with Social Security and Private Provision of Health Insurance

The probabilities of compliance with social security taxes (Spain) and of receiving an employer-provided health insurance plan (United States) are pre-

Table 9.4 **OLS Estimates of Earnings Equations for Spain and the United States[a] (dependent variable: log of earnings)[b]**

	Spain		United States	
Intercept	5.119	5.523	4.030	4.720
	(0.025)	(0.032)	(0.027)	(0.039)
Female	−0.141	−0.132	−0.128	−0.097
	(0.019)	(0.017)	(0.021)	(0.016)
Married	0.219	0.151	0.216	0.096
	(0.012)	(0.011)	(0.014)	(0.011)
Married*female	−0.239	−0.135	−0.270	−0.121
	(0.019)	(0.017)	(0.019)	(0.015)
Experience	0.028	0.017	0.064	0.028
	(0.001)	(0.001)	(0.001)	(0.001)
Experience^2	−0.053	−0.033	−0.112	−0.052
	(0.027)	(0.002)	(0.003)	(0.002)
Experience*female	−0.005	−0.005	−0.015	−0.009
	(0.002)	(0.001)	(0.002)	(0.001)
Experience^2*female	0.008	0.011	0.020	0.015
	(0.004)	(0.003)	(0.005)	(0.003)
Education	0.075	0.043	0.106	0.063
	(0.021)	(0.001)	(0.001)	(0.001)
Agriculture		−0.140		−0.061
		(0.033)		(0.048)
Energy, gas. water		0.186		0.304
		(0.031)		(0.039)
Mining and chemicals		0.239		0.283
		(0.031)		(0.038)
Metal industries		0.146		0.238
		(0.025)		(0.033)
Food. beverage. tobacco		0.056		0.127
		(0.025)		(0.040)
Textiles		−0.024		0.089
		(0.029)		(0.046)
Leather		0.159		−0.006
		(0.083)		(0.134)
Footwear		−0.014		−0.154
		(0.039)		(0.090)
Wood and furniture		−0.052		0.136
		(0.030)		(0.041)
Paper, printing, publishing		0.115		0.125
		(0.037)		(0.037)
Other manufacturing		0.065		0.138
		(0.033)		(0.042)
Construction		0.083		0.211
		(0.023)		(0.034)
Trade		−0.076		0.029
		(0.023)		(0.032)
Hotels, restaurants, cafes		0.003		−0.266
		(0.025)		(0.035)

(*continued*)

Table 9.4 (continued)

	Spain		United States	
Repairs		0.016		−0.030
		(0.030)		(0.043)
Transportation		0.086		0.259
		(0.027)		(0.035)
Communication		0.211		0.277
		(0.036)		(0.040)
Insurance, finance		0.297		0.181
		(0.034)		(0.034)
Firm services		0.101		0.123
		(0.026)		(0.035)
Public administration, armed forces[c]		0.287		0.111
		(0.025)		(0.034)
Education and research		0.253		−0.139
		(0.026)		(0.034)
Private services		−0.218		−0.144
		(0.034)		(0.049)
Household services		−0.382		−0.641
		(0.026)		(0.050)
Other services		0.133		0.018
		(0.022)		(0.033)
Tenure (1–5 years)		0.022		0.106
		(0.013)		(0.008)
Tenure (> 5 years)		0.097		0.256
		(0.013)		(0.009)
Part-time		−0.288		−0.759
		(0.012)		(0.009)
Occupation dummies	No	Yes	No	Yes
Number of observations	14,898	14,898	23,402	23,402
Mean of dependent variable	6.397	6.397	5.942	5.942
R^2	0.358	0.518	0.377	0.623

Note: Standard errors are in parentheses.

[a]The model for Spain also includes fifteen region dummies and one dummy for temporary workers. The U.S. model also contains three region dummies, eight occupation dummies, one dummy for race, and one dummy for the union effect. The base group consists of skilled blue-collar single male workers, working full time in the apparel industry.

[b]The dependent variable is monthly earnings (after taxes) for Spain and weekly earnings (before taxes) for the United States in 1990 U.S. dollars (OECD purchasing power parity numbers for 1990 have been used to convert pesetas into U.S. dollars).

[c]Armed forces are included in this category only for Spain.

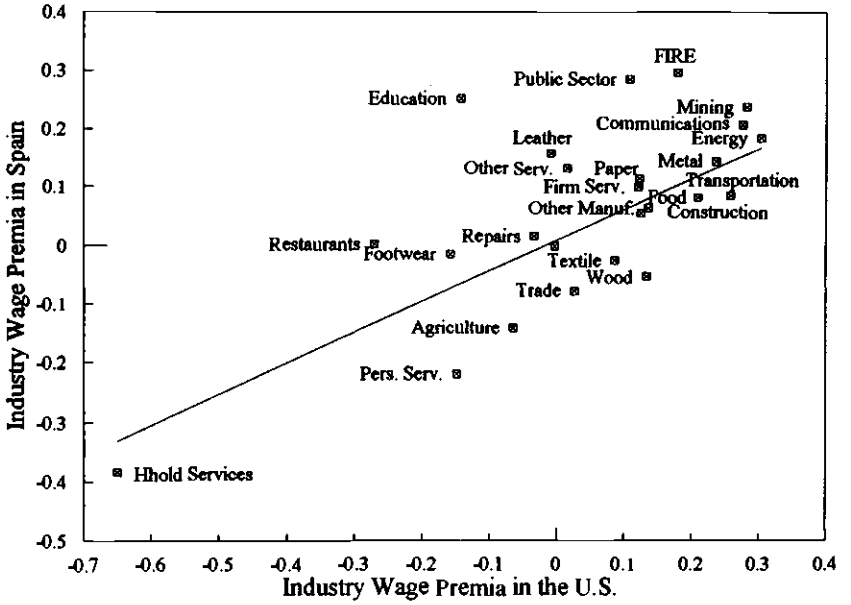

Fig. 9.2 Industry wage premiums in Spain and the United States
Source: Estimates of the industry wage effects reported in columns 2 and 4 of table 9.4.
Note: Base industry is apparel. The slope of the fitted regression line is equal to 0.527.

sented for several socioeconomic groups in table 9.5. Eighty-eight percent of Spanish workers comply with social security, while 68 percent of U.S. workers receive a health insurance plan from their employer. Both probabilities increase with age until age 30, are then stable until age 60, and decline after age 60. Both probabilities are also higher than average for married men, lower than average for single men and women, and much lower than average for married women. On the one hand, the fraction of U.S. workers who do not receive employer-provided health insurance (32 percent) is two to three times larger than the fraction of Spanish workers who are not affiliated with social security (12 percent). On the other hand, more than 99 percent of married men in Spain are affiliated with social security, while 20 percent of married men in the United States do not get health insurance from their employers. Essentially, these figures show all families have access to health insurance in Spain, while an important fraction of families in the United States do not. For example, 28 percent of employed married women in Spain are not affiliated with social security, but they are virtually all covered under the cards of their husbands. By contrast, 43 percent of employed married women in the United States do not get health insurance from their employer. While 78 percent of these women are covered under the plan of their husband or of another family member, 22

Table 9.5 **Proportion of Workers Complying with Social Security Taxes (Spain) and Receiving a Health Insurance Plan from Their Employer (United States)**

	Spain	United States
All workers	0.882	0.678
By age		
16–20	0.430	0.151
21–30	0.842	0.619
31–50	0.913	0.730
51–60	0.940	0.739
61–70	0.863	0.612
By education		
Primary	0.895	0.471
High school	0.844	0.655
Vocational	0.886	0.665
College	0.917	0.809
By tenure		
< 1 year	0.759	0.436
1–5 years	0.837	0.664
> 5 years	0.945	0.850
By gender and marital status		
Single male	0.857	0.603
Single female	0.832	0.614
Married male	0.996	0.802
Married female	0.720	0.569

percent (or 12.6 percent of all employed married women) are not covered.[27] So although compliance with social security in Spain and the provision of health insurance in the United States are driven by similar demand factors, it is important to recognize that the two systems have very different effects on the well-being of workers. We next control for all demand and supply factors simultaneously by estimating a series of probit models.

The estimates of probit models for the decision to comply with social security in Spain are reported in the first two columns of table 9.6. Similarly, probit estimates for whether a worker receives an employer-provided health insurance plan in the United States are reported in columns 3 and 4. The base group in all these models consists of skilled blue-collar, single male workers, working full time in the apparel industry.

The results for Spain show that single women are significantly more likely to comply with social security than single males (coefficient of .146 in column 1). Married men, however, are estimated to be much more likely to comply than single men (coefficient of .787). The situation is reversed for married

27. These percentages are calculated using responses to questions on health insurance coverage in the March 1987 CPS that have been matched to the May 1988 CPS. It is necessary to use the March 1987 data since, although the May 1988 CPS asks many question on the plan received from the employer, it does not ask any direct questions on health insurance coverage.

Table 9.6 **Maximum-Likelihood Probit Estimates of the Probability of Complying with Social Security Taxes (Spain) and Receiving Health Insurance from Their Employer (United States)**

Dependent variable:	Spain		United States	
	Complies with social security		Holds employer-provided health insurance plan	
Independent variables				
Intercept	−1.386	−0.914	−1.736	−0.580
	(0.116)	(0.166)	(0.065)	(0.123)
Female	0.146	0.145	0.150	0.157
	(0.064)	(0.073)	(0.047)	(0.055)
Married	0.787	0.701	0.246	0.050
	(0.093)	(0.101)	(0.033)	(0.038)
Married*female	−1.606	−1.472	−0.586	−0.428
	(0.107)	(0.117)	(0.044)	(0.050)
Experience	0.153	0.132	0.082	0.023
	(0.008)	(0.009)	(0.004)	(0.005)
Experience^2	−0.219	−0.177	−0.143	−0.051
	(0.019)	(0.021)	(0.008)	(0.009)
Experience*female	−0.093	−0.081	−0.027	−0.019
	(0.010)	(0.010)	(0.005)	(0.006)
Experience^2*female	0.164	0.140	0.046	0.036
	(0.022)	(0.023)	(0.011)	(0.013)
Education	0.094	0.061	0.100	0.055
	(0.007)	(0.008)	(0.004)	(0.006)
Family income (÷ 10,000)	0.051	0.018	0.035	−0.006
	(0.005)	(0.005)	(0.005)	(0.005)
Agriculture		−0.201		−0.764
		(0.174)		(0.151)
Energy, gas, water		0.750		0.444
		(0.327)		(0.141)
Mining and chemicals		0.893		0.389
		(0.293)		(0.132)
Metal industries		0.879		0.467
		(0.211)		(0.106)
Food, beverage, tobacco		0.178		0.243
		(0.120)		(0.132)
Textiles		0.220		0.583
		(0.137)		(0.154)
Leather		0.069		0.997
		(0.435)		(0.567)
Footwear		−0.184		−0.026
		(0.174)		(0.276)
Wood and furniture		0.146		0.107
		(0.184)		(0.130)
Paper, printing, publishing		0.016		0.091
		(0.230)		(0.120)
Other manufacturing		0.232		0.241
		(0.219)		(0.137)

(*continued*)

Table 9.6 (continued)

	Spain		United States	
	Complies with social security		Holds employer-provided health insurance plan	
Construction		0.501		−0.547
		(0.156)		(0.106)
Trade		−0.081		−0.297
		(0.102)		(0.101)
Hotels, restaurants, cafes		0.027		−0.784
		(0.114)		(0.108)
Repairs		0.187		−0.462
		(0.207)		(0.131)
Transportation		0.216		−0.110
		(0.199)		(0.110)
Communication		0.591		0.341
		(0.256)		(0.145)
Insurance, finance		0.863		0.072
		(0.317)		(0.107)
Firm services		0.474		−0.391
		(0.140)		(0.109)
Public administration, armed forces[a]		0.948		−0.023
		(0.179)		(0.109)
Education and research		0.508		−0.268
		(0.135)		(0.105)
Private services		0.132		−0.892
		(0.146)		(0.152)
Household services		−0.272		−1.990
		(0.107)		(0.276)
Other services		0.624		−0.203
		(0.116)		(0.102)
Tenure (1–5 years)		0.221		0.502
		(0.057)		(0.027)
Tenure (> 5 years)		0.337		0.935
		(0.061)		(0.031)
Part-time		−0.778		−1.180
		(0.048)		(0.032)
Covered by a collective agreement				0.548
				(0.034)
Occupation dummies	No	Yes	No	Yes
Number of observations	14,727	14,727	19,908	19,908
Log-likelihood	−2,845.4	−2,483.3	−11,162.4	−8,559.8
Percentage of successes	0.883	0.883	0.678	0.678
Pseudo-R^2	0.357	0.437	0.108	0.316

Notes: The model for Spain also includes fifteen region dummies and one dummy for temporary workers. The U.S. model also contains three region dummies and one dummy variable for race. The base group consists of skilled blue-collar single male workers, working full time in the apparel industry. Standard errors are in parentheses.

[a]Armed forces are included in this category for Spain only.

women, who are much less likely to comply with social security than single women (coefficient of −.819, which is the sum of .787 and −1.606). The results also indicate that family income increases the probability of compliance with social security. This result can be interpreted as an income effect. The estimated effects of demographic variables are not significantly changed when a series of job characteristics variables is included in the probit model reported in column 2. The estimated magnitude of the coefficients is nevertheless reduced. This is particularly true for the effect of family income.

The results are thus consistent with demand factors playing a major role in the decision to comply with social security. In most cases, married women already have access to health care under their husband's social security card. They thus receive few benefits from complying with the social security tax. By contrast, a married man whose wife does not work gains a lot by complying with social security because all his dependents are covered under his card. The estimated effect of potential experience on the probability to comply with social security is also positive. This finding is not surprising, since young workers are already covered under their parents' cards. More-educated workers are also more likely to comply with social security.

Estimates of a probit model for whether or not a worker has an employer-provided health insurance plan in the United States, as a function of demographic characteristics only, are reported in column 3. The estimated probit coefficients follow a pattern similar to the estimated coefficients for Spain. In particular, married men are more likely to be covered by such a plan than single men, while married women are less likely to be covered than single women. The probability of coverage by such a plan also increases with potential experience and with years of education. Finally, family income has a positive effect on the probability of coverage by an employer-provided health insurance plan.

The estimated effects change substantially when job characteristics are included as regressors in column 4. For example, the effect of the marriage dummy is no longer significant, and the effect of potential experience is reduced by a factor of four. In addition, the effect of family income is now negative and not significant, although married women remain less likely than single women to be covered. Overall, job characteristics (supply factors) explain an important part of the variation in the probability of coverage by a employer-provided health insurance plan.[28]

The estimated coefficients reported in columns 2 and 4 for the job characteristics are similar in the two countries. Both the probability of compliance with social security and the probability of coverage by a health insurance plan increase with tenure and are lower for part-time than for full-time jobs. The

28. Demand factors may be less important in the United States than in Spain because an important fraction of the population has no health insurance coverage. For example, when a married man in the United States does not have a health insurance plan, his wife will have a strong demand for health insurance. This is not the case in Spain, since virtually all married men have health insurance.

weighted correlation coefficient between the estimated industry effects in the two countries is positive (.666) and significant. These estimated industry coefficients are plotted in figure 9.3. The figure clearly shows the positive association between the estimated effects in the two countries (the slope of the fitted regression line is .262). This is consistent with supply factors being a key determinant of both the probability of compliance with social security and the probability of coverage by a health insurance plan. The industry wage effects are also positively correlated to the industry effects on the probability of compliance (.885) and the industry effects on the probability of holding a health insurance plan (.752). These correlations are consistent with the existence of labor market rents at the industry level that are dissipated in the form of both wages and employee benefits.

In table 9.7, by running several second-stage regressions, we further analyze the determinants of the industry propensities to comply with social security and to provide health insurance plans. More precisely, we run weighted regressions of the estimated industry effects on a series of industry characteristics.[29] The estimated industry effects are the estimated probit coefficients renormalized in term of marginal impacts on probabilities. One problem with this approach is that the set of available industry characteristics for Spain is quite limited. For instance, we do not have direct measures of industry concentration rates or of shares of unionization.[30] We proxy these variables with value added per worker and the numbers of workdays lost because of strikes (per employee). We also include the industry unemployment rate as a measure of labor market tightness, and the fraction of women in the industry as a measure of "feminization" of the industry. The results reported in the first column of table 9.7 indicate that log value added per worker has a positive and significant effect on the industry propensity to comply with social security. The other estimates indicate that workdays lost because of strikes also have a positive but not statistically significant effect on the probability of compliance with social security.[31] The presence of strong and militant unions may thus help enforce compliance with social security taxes. Perhaps surprisingly, the effect of the unemployment rate is not statistically significant. The fraction of women in the industry has a negative and significant (at the 90 percent level) effect on the probability of compliance. Firms in industries with a high concentration of women are thus

29. The explanatory variables used in the second step cannot be included in the original probit models (table 9.6, columns 2 and 4) since they are perfectly colinear with the industry dummies. The weights used in the regressions are industry employment.

30. In Spain, the share of unionization is not representative of the strength of the union in each industry. The percentage of unionization in Spain is very low, but every agreement reached between unions and employers covers every worker, independent of their union status. Besides this, many agreements are reached at the industry level instead of at the firm level.

31. To approximate union strength, variables such as number of collective agreements, workers covered by collective agreements, and wage increase agreed with unions were also included in this regression, but none of them was significant.

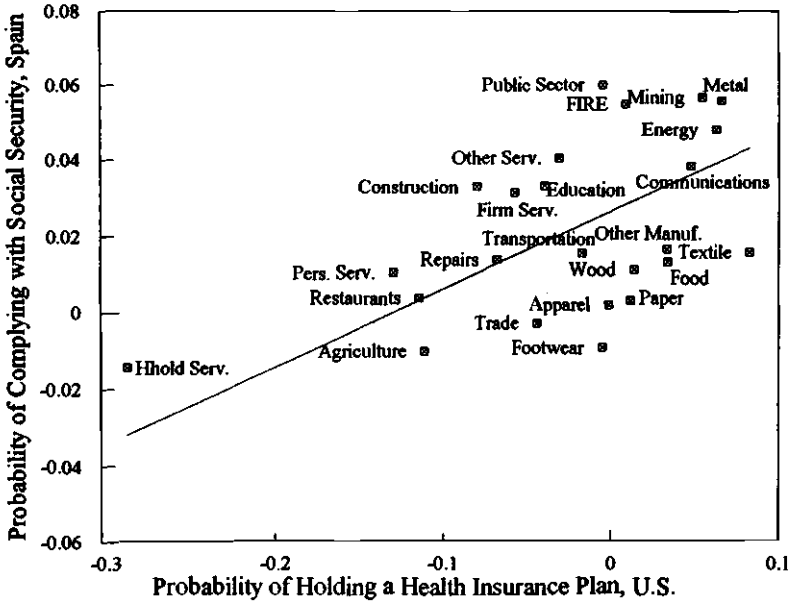

Fig. 9.3 Probability of compliance with social security in Spain, versus probability of holding an employer-provided health insurance plan in the United States

Source: Estimates of the industry wage effects reported in columns 2 and 4 of table 9.6 renormalized in terms of marginal impacts on probabilities.

Note: Base industry is apparel. The slope of the fitted regression line is equal to 0.262. The leather industry (it only employs .06 percent of workers in the United States) lies outside the bounds of this figure; its coordinated are (.143,.005).

less likely to comply with social security than firms with a low concentration of women.

The second-stage estimates for the United States are reported in the second column of table 9.7. The explanatory variables are similar to the ones used in Spain except that we now use the fraction of workers covered by collective agreements as a measure of union power.[32] The estimated effects of log value added per worker and of fraction of workers covered by collective agreements are positive and statistically significant, while the estimated effects of the unemployment rate and of the fraction of women in the industry are negative but not statistically significant. Interestingly, the estimated effect of log value added per worker on industry propensities is comparable in Spain and in the

32. For the sake of comparability with Spain, the probit coefficients used to construct the right-side variable were estimated without including a dummy variable for union coverage in the original probit model. These estimated industry effects are nevertheless very similar to the ones reported in column 4 of table 9.6.

Table 9.7 **Second-Step Estimates of the Effects of Industry Characteristics on the Propensity to Comply with Social Security (Spain) and to Receive Health Insurance (United States)**

	Spain	United States
Dependent variable:	Estimated industry effect on probability of complying with social security	Estimated industry effect on probability of holding a health insurance plan
Log of value added per worker	0.061	0.104
	(0.020)	(0.031)
Unemployment rate	0.015	−0.011
	(0.110)	(0.008)
Workdays lost because of strikes (per employee)	0.042	
	(0.030)	
Fraction of workers covered by collective bargaining agreements		0.358
		(0.124)
Fraction of workers who are women	−0.097	−0.016
	(0.056)	(0.099)
Adjusted R^2	0.451	0.544
Number of observations	22	23

Note: The right-hand side variables in the second-step regressions are the estimated industry effects in probit models (like those reported in table 9.6) renormalized in terms of marginal effects on the probability. The renormalization is done by multiplying the probit estimated coefficients by the standard normal density evaluated at the sample participation rate. The probit coefficients for Spain are from column 2 in table 9.6, while the probit coefficients for the United States are from a model similar to the one reported in column 4 of table 9.6 but in which the dummy variable for union contract coverage has been excluded (see text).

United States. This suggests once again that similar supply factors, such as rent-sharing considerations, are at work in the two countries.

In summary, the empirical results are consistent with the model presented in section 9.2. Demand and supply factors seem to be key determinants of both the probability of compliance with social security in Spain and the probability of coverage by an employer-provided health insurance plan in the United States.

9.4 Conclusions and Welfare Implications of the Results

The main finding of this paper is that although financing of health insurance in Spain and in the United States imposes very different constraints on each country's workers and firms, the two systems produce markedly similar outcomes in the two countries because of widespread noncompliance with social security taxes in Spain. This conclusion is based on the empirical finding that the same supply and demand factors seem to explain the private decision to provide health insurance in the United States and the decision to comply with

social security taxes in Spain. In Spain, the extra costs of financing the social security system are high for firms that employ the kind of workers for whom health insurance is not provided in the United States. These firms prefer going underground, and facing the risk of being detected and penalized, to paying the tax. Our theoretical analysis clearly shows that forcing these firms to comply with social security would have adverse employment effects. These adverse employment effects were socially unacceptable in Spain in 1985, when the unemployment rate was almost 20 percent. This explains why the government did not more strictly enforce the payment of social security taxes.

It is unlikely, however, that such widespread noncompliance would be tolerated in the United States if health insurance coverage was mandated for all workers or if a tax was imposed to finance a government-administered program covering all otherwise uninsured workers. The Spanish experience nevertheless suggests some important lessons. First, noncompliance is more likely to happen in specific industries employing specific types of workers, such as married women. Enforcement efforts should thus target these industries if the goal is to enforce mandatory contributions to social security. In addition, U.S. firms not currently providing health insurance to their workers would have to adjust their behavior to the new institutional constraints that would be imposed on them. Without the option of not complying, employment in these firms would probably be reduced. The resulting labor market distortions would also cause social welfare to be reduced. It should be clear, however, that other factors not explicitly discussed here could also have important effects on social welfare. In particular, private provision of health insurance is bound to be inefficient because of adverse selection. Under some circumstances, mandating health insurance coverage could thus be a second-best equilibrium. Labor market distortions could be the price the United States has pay to improve the overall efficiency of its health care system.[33]

More important, even if the Spanish system cannot be directly implemented in the United States, it works in the sense that (1) essentially all workers have comprehensive health insurance coverage and (2) employment distortions are smaller than in a rigid system in which noncompliance would not be tolerated. The big difference between the two countries is that essentially all married males have a social security card in Spain, while many heads of households do not have health insurance coverage in the United States. It thus seems relatively easy for Spanish workers to get covered under social security if they really need it. By contrast, many U.S. workers and their dependents do not have any health insurance coverage. Although the proportion of U.S. workers who are covered by health insurance policies (85.7 percent in the March 1987 CPS) is larger than the proportion of workers who hold an employer-provided health insurance plan under their name (67.8 percent), an important fraction of work-

33. See, for example, Aaron (1991) and Diamond (1992) for a discussion of health insurance reform in the United States.

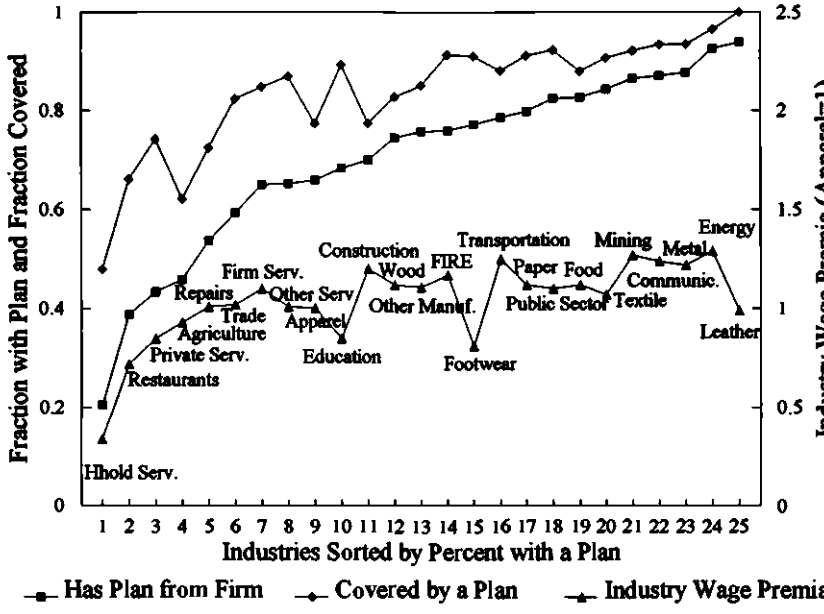

Fig. 9.4 Relationship among health insurance provision, health insurance coverage, and wages by industry in the United States

Sources: Industry wage premiums are from column 4 of table 9.4; the fraction of workers holding a health insurance plan was computed using the May 1988 CPS; the fraction of workers covered by health insurance was computed using the March 1987 CPS.

ers is still uncovered. A parallel figure for Spain would indicate that virtually everybody is covered under social security. Figure 9.4 indicates that, in the United States, the overall coverage rate follows the same cross-industry pattern as the proportion of workers holding a plan under their name and that the coverage rate is positively correlated with industry wages. This means the industry effects estimated in table 9.6 do not simply reflect the fact that workers in low-wage industries are less likely to hold a plan in their name because they are already covered by the plan of another household member. Rather, it means that all workers in these industries, whether they are teenagers or heads of families with children, are less likely to have health insurance coverage.[34]

In practice, the Spanish system thus works through a cross-subsidization from the employers of married males in high-wage industries to the employers of women and youth who are more likely not to pay taxes. One straightforward interpretation of this pattern of cross-subsidization is that married men tend to work in high-rent jobs (or industries) and that it is efficient to finance the whole health care system out of these labor market rents. The second-step estimates

34. Figure 9.6 suggests a positive correlation between spouses' health insurance coverage, as is found by Holtz-Eakin (ch. 6 in this volume) using data from the PSID.

of the effects of value added per worker on industry propensities are consistent with this interpretation. These facts suggest that cross-subsidization from high-rent to low-rent industries may have efficiency aspects that should not be ignored in current discussions of health insurance reform in the United States.

Data Appendix

Spain

Data from the Survey of Living and Working Conditions

The microdata for Spain were obtained from the Survey of Living and Working Conditions (ECVT), carried out by the Spanish government in the last quarter of 1985 (see Muro, Toharia, and Toharia 1986, for more details). The authors will make the ECVT data set available to other researchers on request.

Wage. Direct measures of wages are not available. The wage measure available is seven brackets of net monthly earnings: less than 25,000 pesetas, 25,001–50,000 pesetas, 50,001–75,000 pesetas, 75,001–100,000 pesetas, 100,001–150,000 pesetas, 150,001–200,000 pesetas, and more than 200,000 pesetas. As mentioned in the text, the earnings variable used in the empirical analysis is defined as the corresponding midpoint of the income bracket. To assess the impact of this imputation scheme on the estimated coefficients reported in columns 1 and 2 of table 9.4, we used a similar imputation scheme for the U.S. earnings variable. To do so, we defined seven income brackets similar to the ones described above that were such that the same fraction of workers was in the upper and in the lower bracket in Spain and in the United States. We then compared the U.S. estimates obtained using this imputed earnings measure to the estimates obtained using actual earnings. The results of these experiments are reported in table 9A.1. Columns 1 and 2 report the estimates for Spain, while columns 3 and 4 report the U.S. estimates obtained using the imputed earnings variable. The results reported in columns 3 and 4 of table 9A.1 are very similar to the results reported in columns 3 and 4 of table 9.4, suggesting that the estimates for Spain are not significantly biased because only seven brackets of earnings are available in the data.

We have also verified that using weekly wages as opposed to the hourly wage did not have a big impact on the estimated coefficients.

Tenure. The measure of tenure in the job is also bracketed. There are six brackets: less than one month, one–six months, between six months and one year, one–two years, two–five years, and more than five years.

Table 9A.1 **OLS Estimates of Earnings Equations (Imputed Income)[a] (dependent variable: log of earnings)[b]**

	Spain		United States	
Intercept	9.508	9.912	4.082	4.537
	(0.025)	(0.032)	(0.024)	(0.037)
Female	−0.141	−0.132	−0.066	−0.057
	(0.019)	(0.017)	(0.018)	(0.016)
Married	0.219	0.151	0.191	0.091
	(0.012)	(0.011)	(0.012)	(0.010)
Married*female	−0.239	−0.135	−0.254	−0.131
	(0.019)	(0.017)	(0.017)	(0.014)
Experience	0.028	0.017	0.056	0.026
	(0.001)	(0.001)	(0.001)	(0.001)
Experience^2	−0.053	−0.033	−0.097	−0.048
	(0.027)	(0.002)	(0.003)	(0.002)
Experience*female	−0.005	−0.005	−0.020	−0.014
	(0.002)	(0.001)	(0.002)	(0.001)
Experience^2*female	0.008	0.011	0.031	0.024
	(0.004)	(0.003)	(0.004)	(0.003)
Education	0.075	0.043	0.095	0.056
	(0.021)	(0.001)	(0.001)	(0.001)
Tenure (1–5 years)		0.022		0.093
		(0.013)		(0.008)
Tenure (> 5 years)		0.097		0.261
		(0.013)		(0.009)
Part-time		−0.288		−0.506
		(0.012)		(0.009)
Industry and Occupation dummies	No	Yes	No	Yes
Number of observations	14,898	14,898	20,566	20,566
Mean of dependent variable	10.786	10.789	5.761	5.761
R^2	0.358	0.518	0.376	0.576

[a]The model for Spain also includes 15 region dummies and 1 dummy for temporary workers. The U.S. model contains additionally 3 region dummies, 8 occupation dummies, 1 dummy for race and 1 dummy for the union effect. The base group consists of skilled blue-collar single male workers, working full time in the apparel industry. Standard errors are in parentheses.

[b]Earnings are defined as monthly earnings (after taxes) for Spain and weekly earnings (before taxes) for United States. Both income measures are based on the same imputation scheme that uses mid-points of seven income brackets.

Family Income. This variable is bracketed in exactly the same way as monthly wage brackets. The imputed variable that consists of midpoints of the brackets is used in the empirical analysis.

Education. The education system in Spain differs slightly from the one in the United States. The relevant question asked in the survey is the following:

"What is the highest level of education that you have completed?" The possible answers were:

- Less than primary (less than six years)
- Primary studies (six years)
- "O"-level studies (eight years)
- "A"-level studies (twelve years)
- Vocational studies (eleven years)
- College degree (fifteen or seventeen years, depending on the degree type)

We have used the number of years of education indicated in parentheses in our empirical analysis.

Married. This variable equals one if the individual answers to being married, as opposed to being single, divorced, or widowed.

Experience. There is no exact measure of labor market experience in the survey. The variable used is potential experience (age − education − 6).

Part-time. This variable equals one if the individual works less than two-thirds of the ordinary working week.

Other Spanish Data

Value Added. This variable was obtained from the National Accounts. It is defined as value added before taxes at market prices, disaggregated by industry.

Total Employment. This variable is defined as total number of occupied workers, disaggregated by industry. Data comes from the National Institute of Employment (INEM).

Value Added per Worker. As defined, this is value added by industry, divided by total employment by industry.

Number of Workdays Lost because of Strikes (per Employee). This is the number of workdays lost because of strikes in the industry in 1985, divided by industry employment. Data source is INEM.

Unemployment Rate. The unemployment rate is defined as the total number of unemployed, divided by total employment plus total unemployment. The total number of unemployed workers is disaggregated by industry. Data source is INEM.

United States

Data from the Current Population Survey

As mentioned in the text, we use microdata from the May 1988 *Employee Benefits Supplement* of the CPS. These data were obtained from the U.S. Bureau of the Census. The earnings data are obtained from the usual outgoing rotation group earnings supplement to the CPS. Most variables we used are very standard and will not be described here. One exception is the total family income variable, which is reported in fourteen income brackets ranging from less than $5,000 to $75,000 and more. We use the corresponding midpoints of each income bracket in the empirical analysis.

Data for the Second-Step Regressions

Industry Unemployment Rate and Employment. These data are based on CPS data as tabulated by the U.S. Bureau of Labor Statistics (source: *Statistical Abstract of the United States* 1989).

Value Added in the Industry. These data were obtained from the National Accounts (source: *Statistical Abstract of the United States* 1989).

Percentage of Workers Covered by Collective Agreement. Statistic are based on calculations of the authors, using May 1988 CPS data.

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